

WHAT IS CLAIMED IS:

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1. An endovascular fastener applicator for endoluminally fastening a
prosthetic to a vessel with a fastener, the applicator comprising:

a tubular body configured for positioning within a vessel;

an expandable portion disposed adjacent a distal end of the tubular body

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and being deployable to support a prosthetic in contact with an inner surface of a vessel;

and

a drive assembly for advancing a fastener into the prosthetic.

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2. An endovascular fastener applicator as recited in claim 1, further
comprising a control assembly operatively connected to said drive assembly for
extracorporeal control of the applicator.

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3. An endovascular fastener applicator as recited in claim 1, further
comprising a delivery tube being disposed for movement within the tubular body and
defining a channel for movement of the drive assembly therewithin, the delivery tube
being configured for advancing a fastener within the tubular body.

4. An endovascular fastener applicator as recited in claim 1, further comprising an elongate control positioned for movement within the tubular body, wherein the expandable portion is operatively connected to a distal end of the tubular body and a distal end of the elongate control, the tubular body and the elongate control being manipulable to facilitate support of the prosthetic in contact with an inner surface of a vessel.

5. An endovascular fastener applicator as recited in claim 4, wherein the elongate control is coaxially disposed with the tubular body.

6. An endovascular fastener applicator as recited in claim 3, wherein the delivery tube is coaxially disposed with the tubular body.

7. An endovascular fastener applicator as recited in claim 1, wherein the drive assembly is coaxially disposed with the tubular body.

8. An endovascular fastener applicator as recited in claim 1, wherein at least a portion of the applicator is fabricated from a shape memory material.

9. An endovascular fastener applicator as recited in claim 1, wherein the drive assembly includes a curved portion oriented at an angle of substantially 90° from a

longitudinal axis defined by the tubular body.

10. An endovascular fastener applicator as recited in claim 1, wherein the drive assembly is configured for axial and rotational motion.

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11. An endovascular fastener applicator as recited in claim 3, wherein the delivery tube includes an applicator head configured to facilitate deployment of a fastener.

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12. An endovascular fastener applicator as recited in claim 1, wherein the expandable portion includes support members that define open interstitial regions therebetween.

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13. An endovascular fastener applicator as recited in claim 12, wherein the support members comprise a plurality of flexible wires.

14. An endovascular fastener applicator as recited in claim 12, wherein the support members comprise a plurality of flexible tapes.

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15. An endovascular fastener applicator as recited in claim 11, wherein the applicator head has a substantially perpendicular orientation to a longitudinal axis

defined by the delivery tube.

5 16. An endovascular fastener applicator as recited in claim 1, wherein the drive assembly includes a drive rod having a rectangular cross-section, the drive rod cooperating with an inner diameter of a fastener whereby movement of the drive rod causes advancement of a fastener.

10 17. An endovascular fastener applicator as recited in claim 1, wherein the applicator is configured to deploy multiple fasteners.

15 18. An endovascular fastener applicator as recited in claim 1, wherein the drive assembly includes at least one fastener guide configured to guide advancement of a fastener, each fastener guide cooperates with a prosthetic for guiding advancement of a fastener.

19. An endovascular fastener applicator as recited in claim 2, wherein the control assembly includes a handle having a pistol-grip trigger configuration.

20 20. An endovascular fastener applicator as recited in claim 11, wherein the applicator head includes an ejection mount disposed for movement relative to a prosthetic and configured for deployment of a plurality of helical fasteners, the ejection

mount has an ejection head with a saw toothed face configured for engaging a prosthetic, facilitating uniform deployment of each fastener deployed.

21. An endovascular fastener applicator as recited in claim 20, further including a ratchet assembly configured to facilitate movement of the ejection mount.

22. An endovascular fastener applicator system for repairing a damaged portion of a vessel, the system comprising:

at least one helical fastener, each helical fastener having a penetrating end and a limiting end;

a prosthetic; and

an endovascular fastener applicator including:

a tubular body configured for positioning within a vessel;

a delivery tube being disposed for movement within the tubular body and configured for advancing each helical fastener within the tubular body, the delivery tube including an applicator head adjacent a distal end thereof, the applicator head being configured for deploying each helical fastener and having a substantially perpendicular orientation relative to a longitudinal axis defined by the delivery tube;

an expandable portion being operatively connected adjacent the distal end of the tubular body and including support members that define open interstitial regions, the support members being configured to support the prosthetic in contact with an inner

surface of the vessel;

a drive assembly being disposed for axial and rotational movement within the delivery tube, the drive assembly including a drive rod configured to cooperate with the helical fastener for advancing the helical fastener and facilitating deployment thereof to the prosthetic; and

a control assembly operatively connected to the drive assembly for extracorporeal control of the applicator.

23. An endovascular fastener applicator system as recited in claim 22, wherein the applicator head is configured for engaging an interior portion of the prosthetic to facilitate uniform deployment of each helical fastener.

24. An endovascular fastener applicator system as recited in claim 22, wherein the drive rod has a cross-section corresponding to an interior cross-section defined by each helical fastener and in cooperation facilitates advancement and deployment of each helical fastener.

25. An endovascular fastener applicator system recited in claim 22, wherein the prosthetic includes an interior band having anchor pads circumferentially spaced about and implanted within the band, the pads corresponding to the open interstitial regions of the expandable portion, the drive assembly further including guide

wires being configured for guiding advancement of each helical fastener and having anchor legs adjacent a distal end of each of the guide wires, the anchor legs releasably engaging the anchor pads prior to deployment of each helical fastener and being retractable from the prosthetic upon deployment of each helical fastener.

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26. An endovascular fastener applicator system as recited in claim 22, wherein the applicator head includes an ejection mount being configured for deploying at least one helical fastener and movable relative to an interior circumference of the prosthetic for deploying each helical fastener, the ejection mount including an ejection head having a saw-toothed face for engaging the internal circumference of the prosthetic, the ejection head facilitating uniform deployment of each helical fastener.

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27. An endovascular fastener applicator system as recited in claim 26, further including a ratchet assembly being configured to facilitate movement of the ejection mount.

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28. A method for endoluminally repairing a damaged portion of a vessel, the method comprising the steps of:

providing an endovascular fastener applicator for endoluminally fastening a prosthetic to a vessel with a fastener, the applicator including: a tubular body configured for positioning within a vessel, an expandable portion disposed adjacent a

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distal end of the tubular body and being deployable for supporting a prosthetic in contact with an inner surface of a vessel, and a drive assembly for advancing a fastener into a prosthetic;

5 expanding the expandable portion adjacent an inner surface of the vessel to facilitate support of a prosthetic in contact with a vessel;

 advancing a fastener with the drive assembly to a site for deployment of the fastener; and

 deploying the fastener with the drive assembly to penetrate the prosthetic.